Claims 1, 14,44, and 67 have been amended to restrict the claims to use of the segmentation mask of largest area. Support for this change is found on page 31, line 10.

The office action states in section 7 that Claims 1-3, 11, 12, 14-21, 23-31, 41-42, 44-50, 53-58, 67, 74-79 are rejected under Section 35 U.S.C. 103(a) as being unpatentable over Cabib et al, further in view of Lee et al and Bostick et al.

Applicant continues to state that one of ordinary skill in the art would not apply the teaching of Cabib to the present invention. Cabib is overwhelmingly concerned with the combination of very high resolution spectroscopy and high resolution microscopy to the problem of looking at cells, not to *in vivo* macroscopic dermoscopy . The fact that Cabib includes in the 7 columns of summary of the invention a list of every type of illumination light, (except infra-red light), every type of imaging system (except telescopes), every type of detector (except the human eye), and every type of wavelength separation, does not change the overwhelming thrust of the Cabib patent for one of ordinary skill in the art.

Cabib in fact explicitly teaches away from the method of the present invention in the following passage: Col 3 lines 29-34

"All these types of filter and tunable filter based systems have not been used successfully and extensively over the years in spectral imaging for any application, because of their limitations in spectral resolution, low sensitivity, and lack of easy-to-use and sophisticated software algorithms for interpretation and display of the data."

Examiner has stated that Cabib cites the above lines as the deficiencies of related arts, which he has solved. Cabib indeed recounts his overcoming of the cited deficiencies, in that he uses an interferometric technique to look at the fluorescence light from cells under a microscope, and he does not "throw away" light with his interferometric technique as the prior art does. The present invention does not use fluorescence, and does throw away light , and solves the problem in a different way. Note that Cabib says in col. 2 line 29

"There are three basic types of spectral dispersion methods that might be considered for a spectral bio-imaging system: (i) spectral grating, (ii)spectral filters and (iii) interferometric spectroscopy. As will be described below, the later is best suited to implement the methods of the present invention."

Note that Cabib has not solved the problems of (i) and (ii) (which includes the present invention). Since Cabib explicitly states that the spectral filter method is no good, he teaches away from the present invention.

An analysis of the reference by Lee et al cited by Examiner shows that Lee is exclusively interested in the segmentation of images, and the only values cited are "threshold values needed to segment the lesions and the normal skin." Cited in the first line of the first paragraph of "IV. Step 2: Threshold values" on page 603. Applicant states again that such values are not related to the estimated values referred to in the claims such as

> "computes at least one estimated value for each digital image at each spectral band which is a function of a characteristic of the region of interest determined by the segmentation mask"

Lee differs from the instant invention in that Lee does not apply the mask generated in one spectral band to the other spectral bands. Lee segments *each* image. Lee notes that, for some images, there is no contrast which can be used to generate the boundary, and that the blue image has the least problems with finding the boundary. There is no teaching that the blue image is generally the largest image of the lesion. There is no teaching that the largest image provides the best segmentation mask. There is no teaching of using a single segmentation mask for images in all spectral bands.

As agreed in the above mentioned interview, the inclusion of "a segmentation mask of largest area" in independent claims 1, 14, and 44 (as amended) makes them patentable over the combination of Cabib and Lee.

In addition, Examiner has stated "Regarding claim 2, Lee et al further discloses the method of claim 1, further comprising estimating at least one value which is a function of the texture of the region of interest (Page 604, paragraphs 1 and 2; intensity value S). Applicant restates the position that intensity value S refers to the maximum number of pixels of one intensity level of normal skin. A curve such as fig. 4 would result from a uniform lesion with no texture, since the curve just gives the number of pixels with a certain intensity value as a function of intensity. (Note the spread in intensity values from normal skin (peak S), which is presumably without texture, is the same as the spread in intensity of light reflected from the lesion

(peak M)). Applicant states that Lee et al say nothing about texture which is well defined in the specification. Texture is a spacial grouping of pixels having a certain intensity. Claim 2 is thus patentable over the combination of Cabib and Lee, and over claim 1.

In addition, Examiner states "Regarding claim 3, Lee et al further disclose the method of claim 1, further comprising estimating at least one value which is a function of the texture of the region of interest (Page 604, paragraphs 1 and 2; intensity value S). The response above answers this statement.

In addition, Examiner states "Regarding claim 11, Lee et al further disclose the method of claim, wherein the segmenting step comprises generating the segmentation mask from a digital image by: removing digital signals from the digital image which corresponds to hair structure;...." Lee states on p 605 col 1 "however, the algorithm had some difficulties in recognizing thick hairs. Over 60% of the poor category in each run .... was degraded by the presence of thick hairs." Lee notes the problem, but provides only the solution for removing noise and blobs having less than a defined "width" as measured by the number of neighboring pixels, which incidentally removes thin hairs, and will not handle hairs in general. Claim 11 is thus allowable over Lee in combination with Cabib.

In addition, Examiner states "Regarding claim 17, Cabib et al further disclose the method of claim 14 , wherein the illuminating step further comprises illuminating the region of interest with light in at least one spectral band which penetrates the papilary dermis and re-emitted therefrom (Col 7 lines 60-64)" These lines from Cabib state "According to still further features in the described preferred embodiments the collimated light is selected from the group consisting of light transmitted through the sample, light reflected from the sample, light scattered from the sample and light emitted from the sample." There is no statement that the light penetrates, and is re-emitted. One of skill in the art would read this section that the light emitted from the sample is fluorescent light, which is in a different wavelength band from the illumination light.

In addition, Examiner states "Regarding claim 19, Cabib et al further disclose the method of claim 17 , wherein the illuminating step further comprises illuminating the region of interest with light in the near infrared spectral band (Column 8 lines3-7)" These lines state "According to still further features in the described preferred embodiments the light originates from a source

selected from the group consisting of laser, white light, filtered light, ultraviolet light and a light having a small wavelength range." Infra red is not mentioned in this section. A computer word search of the Cabib file finds no mention of " ir ", or "infra red". Examiner has stated that the table 1 in column 19 cites a spectral range of 400-1000 nm. Applicant states that this range is the range of sensitivity of a silicon CCD array, and has nothing to say about the illumination wavelength. One of ordinary skill in the art of fluorescence microscopy knows that illumination wavelengths are in the ultraviolet and visible ranges, and the fluorescence wavelength is 50-100 nm longer than the visible illumination wavelength, and that infra-red dyes are not used because they are unstable and bleach much faster than shorter wavelength fluorescing dyes.

In addition, Examiner states "Regarding claim 20, Cabib et al further disclose the method of claim 14 , further comprising suppressing specular reflections prior to the digital imaging step. (Column 27 line 67, Column 28 lines 1-8)" These lines state "Fluorescence images are then acquired, one image for each dye, by appropriately rotating two filter wheels, one for selecting the excitation wavelength and another for capturing the emission spectrum, or alternatively, rotating one filter wheel aimed at selecting the excitation wavelength, while capturing the emission spectrum by a triple dichroic filter. Approaches in which tunable filters (no moving pails) are used to control the excitation and/or emission wavelength have also been proposed." Applicant does not understand Examiners reply to the above quote. Perhaps Examiner has confused suppressing "spectral reflection" with "specular reflection".

In addition, Examiner states "Regarding claim 21, Cabib et al further disclose the method of claim 1 , wherein the processor converts the digital signals of each of the digital images into values corrected for the non-uniformities of illumination and of response prior to the segmenting step. (Column 27 lines 22-55; Column 33 lines 9-16)" Applicant states that these two passages correct for unwanted light in the wrong spectral band in the first case, and in the second case the ratio of fluorescence is used to correct for illumination non-uniformity.

The argument above holds also for claim 21.

Regarding claim 23, the above discussion of the Lee reference holds.

Regarding claim 24, Cabib does not disclose segmentation.

Regarding claim 25, Cabib does not disclose segmentation.

Regarding claim 26-31,41, the above discussion of the Lee reference holds.

Further regarding claim 42, Examiner has stated that weight coefficients for a particular training set selected to maximize specificity subject to the constraints of 100% sensitivity to melanoma is a theoretical concept and thus equivalent to Bostock's 92.4% sensitivity. Applicant restates that the *criterion* of 100% sensitivity in the *training set* is not a theoretical concept. It is done routinely in present and past performance of the invention.

In addition, Examiner states "Regarding claim 53, Cabib et al further disclose the system of claim 44 , wherein the filter means comprises a plurality of interference filters mounted on a wheel for stepping any filter into a position intercepting the light from the light source (Column 27 lines 67; Column 28 lines1-8)" These lines state " Fluorescence images are then acquired, one image for each dye, by appropriately rotating two filter wheels, one for selecting the excitation wavelength and another for capturing the emission spectrum, or alternatively, rotating one filter wheel aimed at selecting the excitation wavelength, while capturing the emission spectrum by a triple dichroic filter." Such devices are used for fluorescence excitation.

In addition, Examiner states "Regarding claim 55, Cabib et al further disclose the system of claim 54 , wherein the set of interference filters includes a filter whose center lies in at least one spectral band in the near infra red range whose center lies between about 750 and 1000 nm (Figs. 4 and 5, Column 20 lines 31-62)" Cabib does not say anything about a filter for shining light on the sample within the infra red spectral range. Figs. 4 and 5 show fluorescence spectra. In fact, Applicant is suspicious of the data, since in the above cited passage Column 20 lines 31-62 contains the lines "Since such a camera simply integrates the optical signal over the spectral range (e.g., 400 nm to 760 nm) of the CCD array, the 'equivalent' monochrome CCD camera image can be computed from the 3D spectral image data base by integrating along the spectral axis, as follows:" Applicant suggests on the basis of this citation that *all* references to infra red, if any may be found, and the figures (in spectral range above 760 nm), be ignored.

In addition, Examiner states "Regarding claim 34, Schindewolf et al further disclose the system of claim 33..... , Schindewolf et al state "The longest distance between the three color centers in each lesion is an important feature of the classification." Schindewolf et al use data

from three different wavelengths, and do not disclose intensity moments as defined in the specification for one image.

In addition, Examiner states "Regarding claim 35, Schindewolf et al further disclose the system of claim 14..... blotchiness, Schindewolf et al do not discuss blotchiness nor show the method defining blotchiness described in the specification.

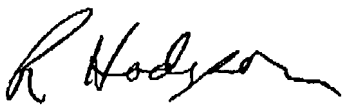
Regarding claim 10 and 65, Examiner has introduced Tryggvason et al (U.S. 5,660,982) as prior art. Tryggvason et al deal solely with *in vitro* specimen of cells which are treated with modern techniques to identify sequences of subunits of DNA. It is a far stretch of the imagination to imagine that one of ordinary skill in the art of imaging of skin lesions would think to combine such work with the material of the instant invention.

In summary, all independent claims not allowed now contain as a limitation "a segmentation mask of largest area", and are thus allowable. All dependent claims dependent on these independent claims are likewise allowable, and also independently allowable as argued above.

No additional fee is required. Any insufficiency or overage may be debited or credited to deposit account 08/2240.

On the basis of the above amendments and remarks, reconsideration of this application and its early allowance is requested.

Respectfully,



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